

September 16, 2010

Town of Lauderdale-By-The-Sea
4501 Ocean Drive
Lauderdale-By-The-Sea, Florida 33308

Attention: Bud Bentley, Interim Assistant Town Manager

Subject: Stormwater Master Plan (SMP) – Task 5 Technical Memorandum

Dear Mr. Bentley,

Chen and Associates (C&A) recently completed the Stormwater Master Plan (SMP) Report for the Town of Lauderdale by the Sea. Upon presenting the results to the Town Commission and subsequent meetings with Town staff, additional services were requested to apply the findings of the SMP to create Capital Improvement Project (CIP) Budgets and prioritize these recommended projects within the SMP. This technical memorandum demonstrates the results of the additional services, Task 5: Project Analysis and Prioritization.

Background

The work identified in the Scope of Service included the following:

- 5.1 Review comments of priorities from Commission
- 5.2 Prioritize project areas according to comments from Commission
- 5.3 Divide swale program and selected improvement budgets into smaller project areas
- 5.4 Review maintenance budgets for ongoing drainage and asphalt programs
- 5.5 Combine stormwater project budgets with ongoing maintenance and asphalt overlay programs
- 5.6 Determine detailed budgets per project area
- 5.7 Attend up to two (2) Commission meetings to discuss the above tasks

RECOMMENDED PRIORITIES

The Commission asked that we provide our recommendations of the Town's top stormwater priorities. As part of our evaluation process, we reviewed the Commission comments for insight to local conditions and consulted with Town staff. Information about our findings is included in Exhibit 1. Our recommendations are show in Table 1 and Table 3.

Stormwater Improvement Projects

Detailed cost estimates were determined for each priority stormwater improvement project. These estimates include the construction cost to address the drainage issue and completely restore the project area, include the overlay of the street if necessary and appropriate. Engineering design and permitting cost estimates were included along with a construction contingency to cover any unexpected items. The cost estimates were then compared with similar projects recently awarded. The cost estimates should be reviewed on an annual basis and adjusted as necessary to match current trends in construction costs.

Table 1 – Priority Stormwater Projects

Item	Project Name	Project Cost	Map Exhibit No.
1.	Flamingo Avenue	\$333,988	2
2.	Downtown Core	\$988,911	3
3.	West Tradewinds Avenue	\$261,146	4
4.	Harbor Drive (Seagrape Drive to East Tradewinds Avenue)	\$242,242	5
5.	Bougainvilla Drive (Pine Avenue to Washingtonia Avenue)	\$457,303	6
6.	Terramar Drive	\$25,218	7
7.	Poinciana Street (Pine Avenue to Washingtonia Avenue)	\$395,472	8
Total		\$2,704,279	

The second level priorities stormwater projects are shown for reference purposes in Table 2.

Table 2 – Second Level Project

Item	Project Name	Project Cost
8	Basin Drive	\$236,352
9	Hibiscus Avenue	\$122,430
10	Datura Avenue	\$140,487
11	El Mar Drive North*	\$1,439,785
12	El Mar Drive South*	\$1,596,903
13	Bougainvilla Drive (Washingtonia Avenue to Commercial Boulevard)	\$807,114
14	Poinciana Street (Washingtonia Avenue to Commercial Boulevard)	\$653,769
15	Harbor Drive (East Tradewinds Avenue to West Tradewinds Avenue)	\$220,682
Total		\$5,217,520

*Note: The cost estimate for the El Mar Drive Improvements is based on the proposed work submitted in the Stormwater Master Plan. The cost estimate will need to be revised based on a scope that is established by the Master Steering Committee.

Neighborhood Swale Restoration Program

The swale and pipe restoration program was divided into smaller project areas corresponding to the respective neighborhoods. A cost estimate for each neighborhood swale program is provided in Table 3. A map of the swale areas is included as indicated in the Table. The costs were determined by estimating:

- Minor drainage pipe repairs required to fix deficient piping,
- Re-grading swales
- Remove and relocate of landscape features that are within the public right-of-way. (An estimated cost for restoring landscape features in the swale was estimated based on findings of the Bel-Air neighborhood and was projected to the other program areas.)
- Completing the project with an asphalt overlay of neighborhood streets if warranted.

The following project list and cost estimate for the Neighborhood Swale Restoration and Drainage Pipe Repair Program.

Table 3 – Recommended Swale and Pipe Repair Projects

Item	Program Area	Drainage Pipe Repairs (1)	Swale Program		Asphalt Overlay Program	Total
			Re-Grade Swale	Landscape (2)		
1	Bel Aire	\$329,129	\$151,200	\$86,400	\$161,100	\$727,829
2	Silver Shores 2	\$20,856	\$51,100	\$29,400	\$108,000	\$209,356
3	Silver Shores 3	\$109,353	\$58,800	\$33,600	\$137,400	\$339,153
4	Silver Shores 1	\$245,548	\$148,400	\$84,900	\$298,200	\$777,048
5	Surf and Yacht Estates	\$17,525	\$53,900	\$30,900	\$57,901	\$160,226
6	Terramar	\$119,027	\$97,300	\$55,800	\$113,700	\$385,827
TOTAL		\$841,437	\$560,700	\$321,000	\$876,301	\$2,599,438

- (1) Location Map in Exhibit 9
- (2) Drainage pipe repair estimates are based on the pipe television reports received and reviewed to date.
- (3) The cost estimate is based on removing, replacing or relocating existing landscaping in the swale.

Note: All project costs are based on estimates in 2010. These estimates should be revised each year to account for changes in construction costs.

Project Budgeting

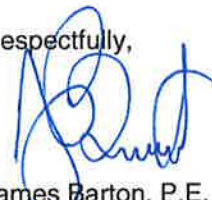
1. The Town budgets for ongoing maintenance of the stormwater drainage system.
2. The Town' Asphalt Overlay Program provides for overlays on average every 15 to 20 years. We found:
 - a. There are areas of Town that have been overlaid in conjunction with sewer projects within the past 5 years.
 - b. There are a number of areas where the City of Fort Lauderdale will do asphalt overlays after installing new water line.

We included the cost for asphalt overlays as a part of a planned priority project and in the swale restoration areas for any street that meets the overlay standard.

3. The drainage pipe inspection and cleaning program were not included as a capital project, as they are already included in the operating budget.

C&A looks forward to meeting with the Town Staff to discuss this memorandum and incorporate any comments.

Respectfully,



James Barton, P.E.
Senior Engineer
Chen and Associates

Prioritization

Program	Comments
Outfall and Pipe Maintenance Program	C&A discussed the ongoing maintenance of the drainage system with Town staff. This program is currently part of the operating budget and is sufficient to effectively maintain the system. Additional costs for maintenance were not required in the CIP budgets.
Swale Restoration Program	The swale restoration program, focusing on providing swale storage in residential neighborhoods, was divided into smaller areas. With a few exceptions, local ponding spots were addressed as pipe repairs in this program.
El Mar Drive	This project will be coordinated through the Master Plan Steering Committee. A detailed budget will not be available until the MPSC finalizes the design scope criteria.
Pervious Pavement	Where applicable, options for pervious pavement were studied, identified and incorporated into budgets. The paved swale areas west of A1A, including Bougainvilla Drive and Poinciana Street were considered candidates for pervious pavement. Areas east of A1A were less likely candidates due to the potential problem of the pervious area clogging with beach sand. Restoration of the alleys may offer an opportunity to use pervious surfaces as an alternative to underground drainage.
Downtown Core	Resolution of severe ponding in the East Commercial area was identified as a priority project.
Bougainvilla Drive	The north end of Bougainvilla Drive, between Washingtonia Avenue and Pine Avenue was separated and identified as a priority area. The paved swales contribute to ponding during rainfall events. The ponds last for more than 24 hours after a rainfall event.

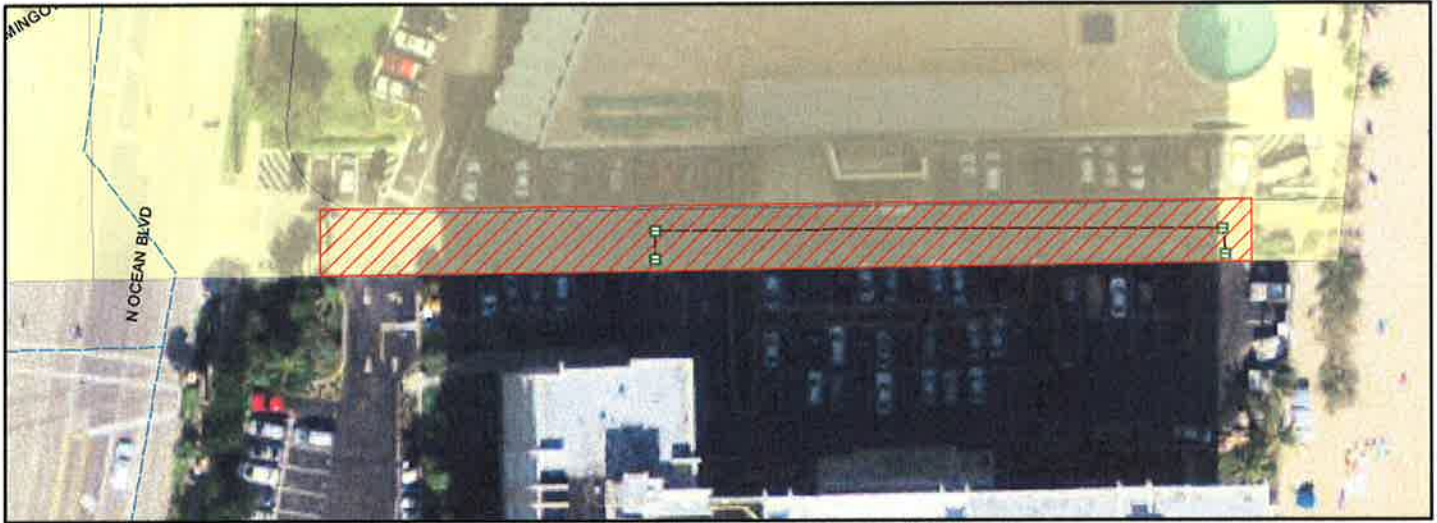
Exhibit 1

Additional areas were identified as possible priority project based on the length of time ponds remained after a rainfall event. Where most of the Town drains within a few hours after a storm, there were some areas where ponding water remained in paved swale areas for more than 24 hours. Table 2 identifies these areas and gives some background on the issues.

Problem Areas

Area	Description of Problem
Harbor Drive	The section of Harbor Drive between Seagrape Drive and East Tradewinds Avenue has a history of poor drainage, which generates resident complaints. The standing water in ponds lasts for more than 24 hours.
West Tradewinds	There is a section of the drainage system where the pipe has been filled in with concrete and requires replacement. This repair should not wait for the swale program. This area has been identified by Fort Lauderdale as where they will be replacing water pipes in the future.
Terramar Drive	There is a drainage outfall structure that sits at a higher elevation than the ground surface. The area around this structure does not drain during rainfall event so the ponding can cover the entire roadway with over 8 inches of water. Although the area drains within a few hours after a rainfall event, the deep water in the roadway remains for extended periods.
Poinciana Drive	As with Bougainvillea Drive (Table 1), the north end of Poinciana between Washingtonia and Pine was separated and identified as a priority area. The paved swales contribute to ponding during rainfall events. The ponds last for more than 24 hours after a rainfall event.
Flamingo Avenue	The end section of Flamingo Avenue experiences extensive ponding, which has reportedly entered the equipment room of the hotel to the north. There are several contributing factors including the low elevation of the east end of the street, the high elevation of the hotel in Fort Lauderdale to the south, the lack of sea wall on the east end allowing beach sand to clog the existing drainage system. This project will require special study and may include a drainage well.














Demolition

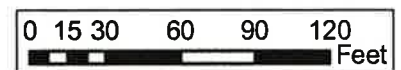


Proposed Improvements



Legend

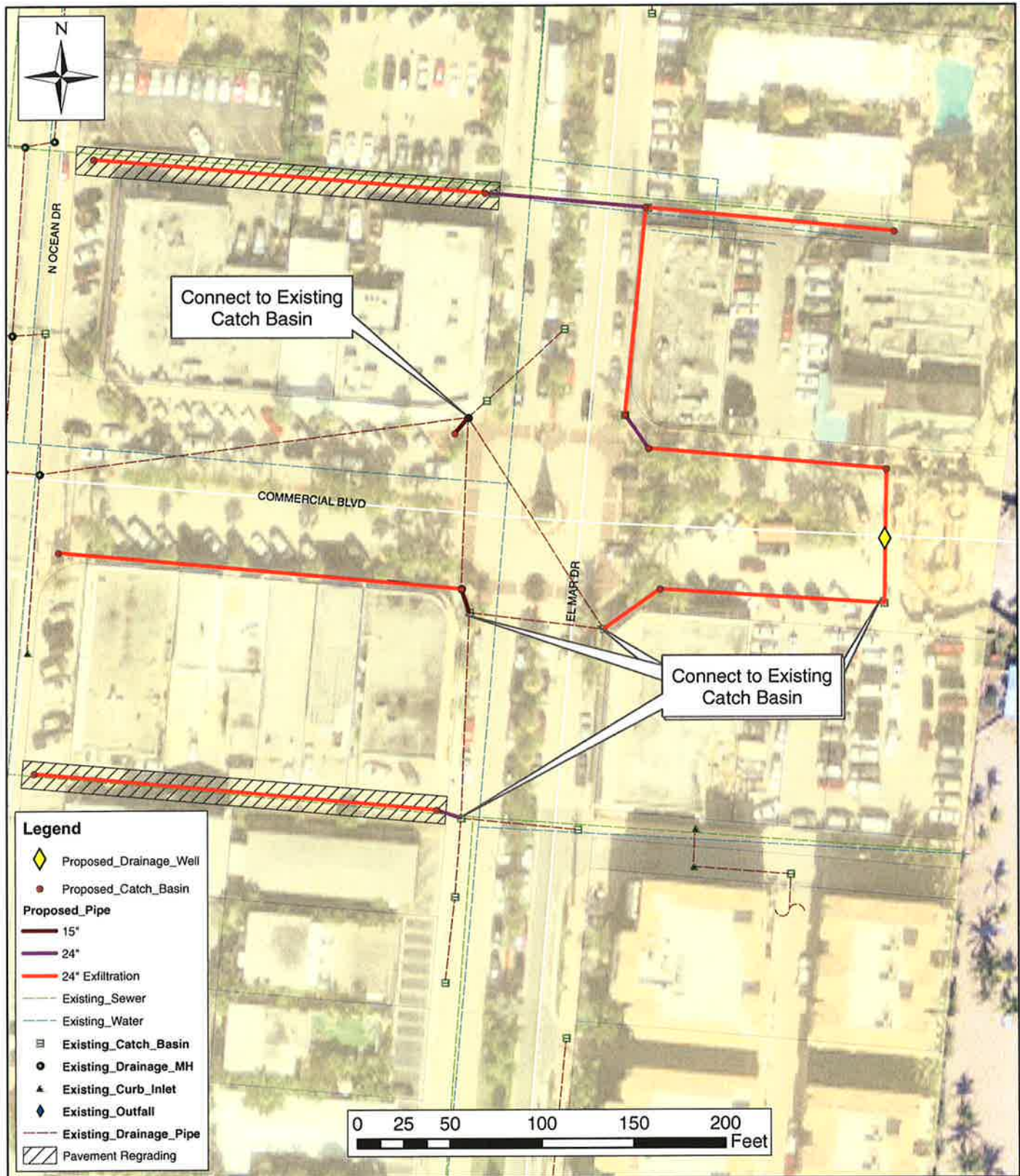
- | | |
|---|--|
|  Proposed_Drainage_Well |  Project Boundary |
|  Proposed_Catch_Basin |  Demolition_Area |
|  15" |  Existing_Catch_Basin |
|  24" Exfiltration |  Existing_Drainage_MH |
|  Existing_Sewer |  Existing_Curb_Inlet |
|  Existing_Water |  Existing_Outfall |
| |  Existing_Drainage_Pipe |



Flamingo Avenue**PROPOSED IMPROVEMENTS - COST ESTIMATE**

DRAINAGE OPTION 1	Quantity	Unit	Unit Price	Total
15" R.C.P. Drainage Pipe	45	LF	\$55.00	\$2,475
24" R.C.P. Drainage Pipe with Exfiltration Trench	350	LF	\$120.00	\$42,000
Catch Basins	4	EA	\$3,000.00	\$12,000
Drainage Well with Control Structure	1	EA	\$60,000.00	\$60,000
Remove and Dispose of Existing Drainage Structure	4	EA	\$1,000.00	\$4,000
Remove and Dispose of Existing Drainage Pipe	455	LF	\$30.00	\$13,650
Utility Offset	1	EA	\$4,000.00	\$4,000
Pavement Restoration	1,750	SY	\$45.00	\$78,750
Subtotal:				\$216,875
Mobilization:				\$21,688
Subtotal:				\$238,563
20% Construction Contingency:				\$47,713
15% Design and Permitting:				\$35,784
5% Construction Administration:				\$11,928
TOTAL COST:				\$333,988

Proposed Alternative Downtown Core Improvements

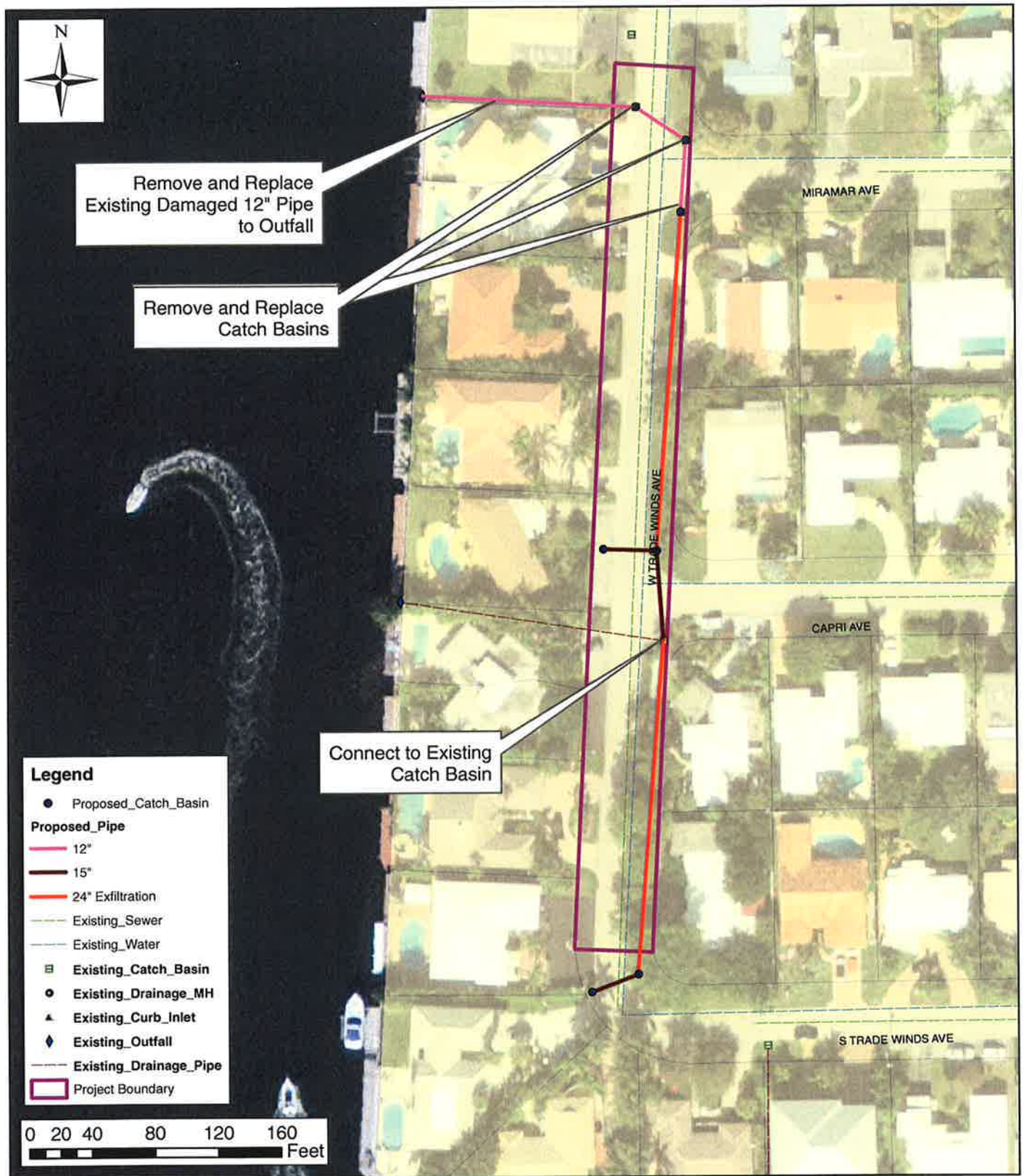


Downtown Core**PROPOSED IMPROVEMENTS - COST ESTIMATE**

DRAINAGE	Quantity	Unit	Unit Price	Total
15" R.C.P. Drainage Pipe	24	LF	\$55.00	\$1,320
24" R.C.P. Drainage Pipe	125	LF	\$80.00	\$10,000
24" R.C.P. Drainage Pipe with Exfiltration Trench	1,264	LF	\$120.00	\$151,680
Catch Basins	13	EA	\$3,000.00	\$39,000
Drainage Well with Control Structure	1	EA	\$60,000.00	\$60,000
Control Structure	0	EA	\$7,000.00	\$0
Conflict Structure	1	EA	\$5,200.00	\$5,200
Connect to Existing Drainage	6	EA	\$2,500.00	\$15,000
Remove and Dispose of Existing Drainage Structure	3	EA	\$1,000.00	\$3,000
Utility Offset	8	EA	\$4,000.00	\$32,000
Pavement Restoration	5,100	SY	\$45.00	\$229,500
Paved Swale, Sidewalk and Driveway Restoration	200	SY	\$60.00	\$12,000
Grass Swale, Sidewalk and Driveway Approach Restoration	200	SY	\$50.00	\$10,000
Re-grade Pavement	1,130	SY	\$65.00	\$73,450
ADA Beach Pedestrian Ramp	1	LS	\$45,000.00	\$45,000
			Subtotal:	\$642,150
			Mobilization:	\$64,215
			Subtotal:	\$706,365
			20% Construction Contingency:	\$141,273
			15% Design and Permitting:	\$105,955
			5% Construction Administration:	\$35,318
			TOTAL COST:	\$988,911

Proposed Alternative - West Tradewinds Avenue

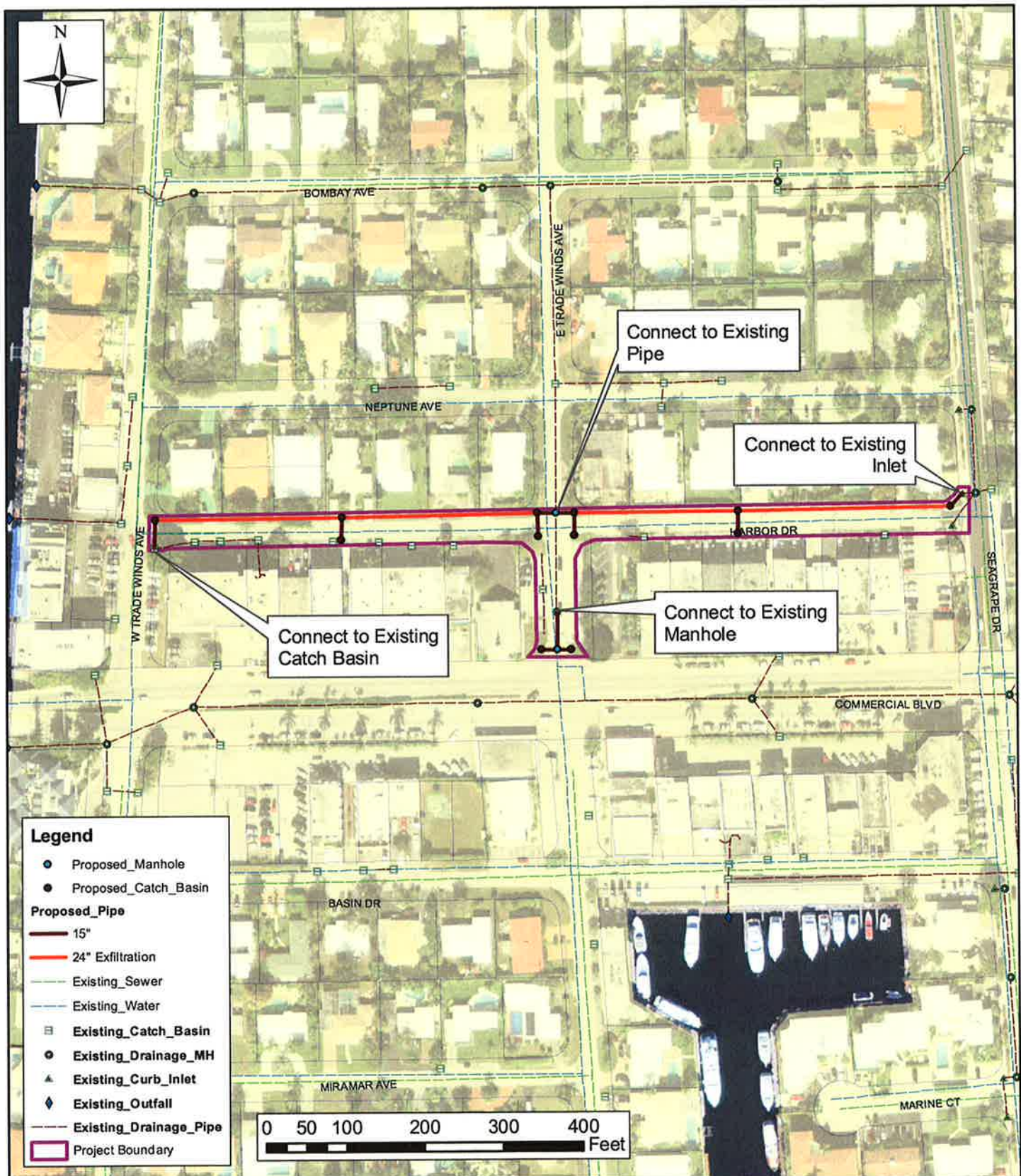
Exhibit 4



West Tradewinds Avenue**PROPOSED IMPROVEMENTS - COST ESTIMATE**

DRAINAGE	Quantity	Unit	Unit Price	Total
12" R.C.P. Drainage Pipe	222	LF	\$45.00	\$9,990
15" R.C.P. Drainage Pipe	115	LF	\$55.00	\$6,325
24" R.C.P. Drainage Pipe with Exfiltration Trench	455	LF	\$120.00	\$54,600
Catch Basins	6	EA	\$3,000.00	\$18,000
Control Structure	1	EA	\$7,000.00	\$7,000
Connect to Existing Drainage	4	EA	\$2,500.00	\$10,000
Remove and Dispose of Existing Drainage Structure	3	EA	\$1,000.00	\$3,000
Remove and Dispose of Existing Drainage Pipe	222	LF	\$30.00	\$6,660
Utility Offset	1	EA	\$4,000.00	\$4,000
Pavement Restoration	150	SY	\$45.00	\$6,750
Grass Swale, Sidewalk and Driveway Approach Restoration	865	SY	\$50.00	\$43,250
Subtotal:				\$169,575
Mobilization:				\$16,958
Subtotal:				\$186,533
20% Construction Contingency:				\$37,307
15% Design and Permitting:				\$27,980
5% Construction Administration:				\$9,327
TOTAL COST:				\$261,146

Proposed Alternative - Harbor Drive



Harbor Drive from Seagrape Drive to East Tradewinds Avenue**PROPOSED IMPROVEMENTS - COST ESTIMATE**

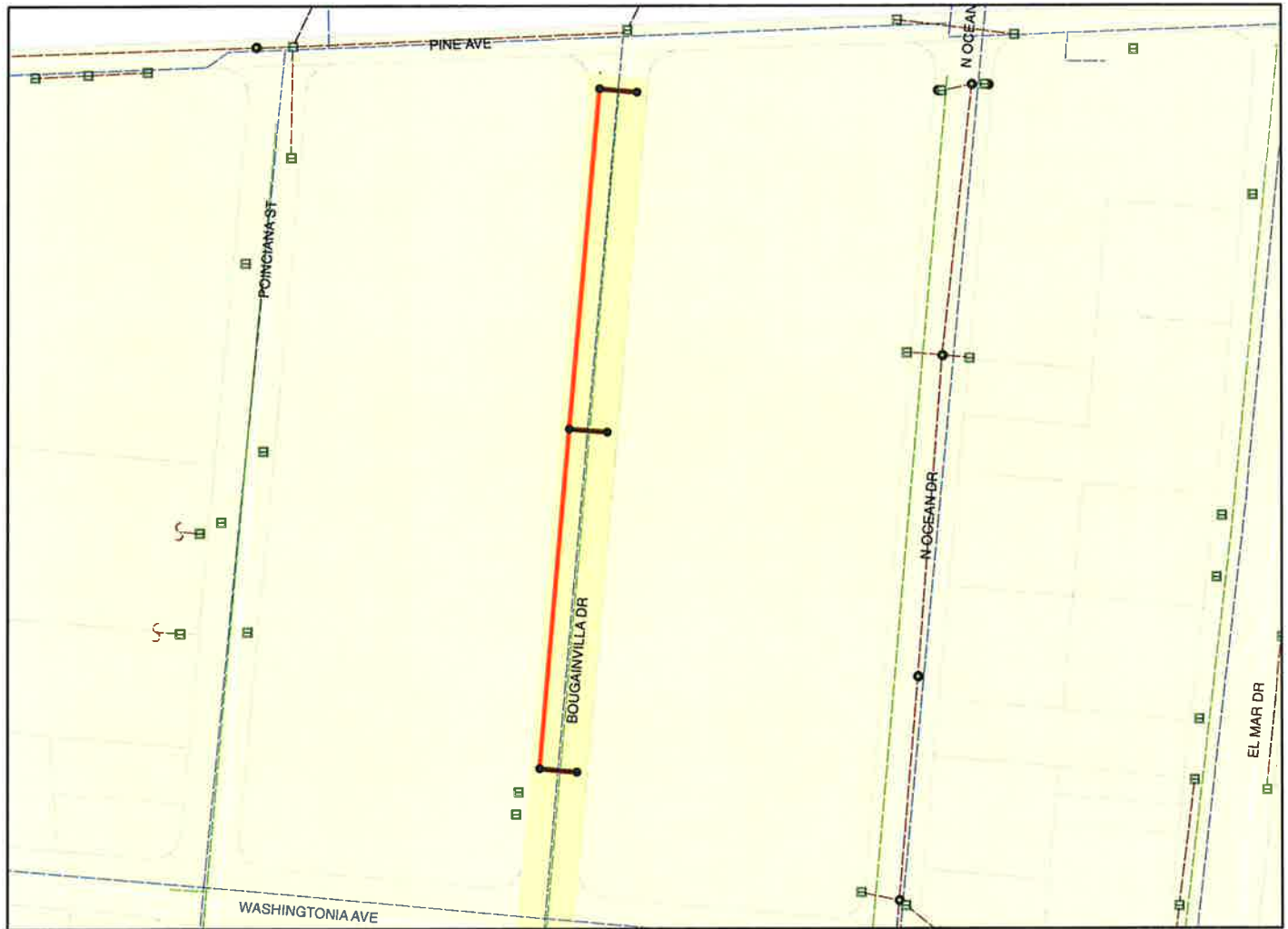
DRAINAGE	Quantity	Unit	Unit Price	Total
15" R.C.P. Drainage Pipe	170	LF	\$55.00	\$9,350
24" R.C.P. Drainage Pipe with Exfiltration Trench	475	LF	\$120.00	\$57,000
Catch Basins	6	EA	\$3,000.00	\$18,000
Drainage Manhole	2	EA	\$3,500.00	\$7,000
Conflict Structure	1	EA	\$5,200.00	\$5,200
Connect to Existing Drainage	3	EA	\$2,500.00	\$7,500
Utility Offset	1	EA	\$4,000.00	\$4,000
Pavement Restoration	150	SY	\$45.00	\$6,750
Grass Swale, Sidewalk and Driveway Approach Restoration	850	SY	\$50.00	\$42,500
			Subtotal:	\$157,300
			Mobilization:	\$15,730
			Subtotal:	\$173,030
			20% Construction Contingency:	\$34,606
			15% Design and Permitting:	\$25,955
			5% Construction Administration:	\$8,652
			TOTAL COST:	\$242,242

Harbor Drive from East Tradewinds Avenue to West Tradewinds Avenue**PROPOSED IMPROVEMENTS - COST ESTIMATE**

DRAINAGE	Quantity	Unit	Unit Price	Total
15" R.C.P. Drainage Pipe	150	LF	\$55.00	\$8,250
24" R.C.P. Drainage Pipe with Exfiltration Trench	490	LF	\$120.00	\$58,800
Catch Basins	6	EA	\$3,000.00	\$18,000
Connect to Existing Drainage	2	EA	\$2,500.00	\$5,000
Utility Offset	1	EA	\$4,000.00	\$4,000
Pavement Restoration	150	SY	\$45.00	\$6,750
Grass Swale, Sidewalk and Driveway Approach Restoration	850	SY	\$50.00	\$42,500
			Subtotal:	\$143,300
			Mobilization:	\$14,330
			Subtotal:	\$157,630
			20% Construction Contingency:	\$31,526
			15% Design and Permitting:	\$23,645
			5% Construction Administration:	\$7,882
			TOTAL COST:	\$220,682

Proposed Alternative Bougainvilla Drive from Pine Ave. to Washingtonia Ave.

Exhibit 6



Legend

- Proposed Catch Basin
- Proposed Pipe
 - 15"
 - 24" Exfiltration
- Existing_Catch_Basin
- Existing_Drainage_MH
- Existing_Curb_Inlet
- Existing_Outfall
- Existing_Drainage_Pipe
- Existing_Sewer
- Existing_Water



Bougainvilla Drive from Pine Avenue to Washingtonia Avenue**PROPOSED IMPROVEMENTS - COST ESTIMATE**

DRAINAGE	Quantity	Unit	Unit Price	Total
15" R.C.P. Drainage Pipe	100	LF	\$55.00	\$5,500
24" R.C.P. Drainage Pipe with Exfiltration Trench	600	LF	\$120.00	\$72,000
Catch Basins	6	EA	\$3,000.00	\$18,000
Conflict Structure	1	EA	\$5,200.00	\$5,200
Remove and Dispose of Existing Drainage Structure	13	EA	\$1,000.00	\$13,000
Remove and Dispose of Existing Drainage Pipe	1,450	LF	\$30.00	\$43,500
Utility Offset	1	EA	\$4,000.00	\$4,000
Pavement Restoration	1,550	SY	\$45.00	\$69,750
Paved Swale, Sidewalk and Driveway Restoration	1,100	SY	\$60.00	\$66,000
			Subtotal:	\$296,950
			Mobilization:	\$29,695
			Subtotal:	\$326,645
			20% Construction Contingency:	\$65,329
			15% Design and Permitting:	\$48,997
			5% Construction Administration:	\$16,332
			TOTAL COST:	\$457,303

Proposed Alternative - Terramar Drive



Legend

- Existing_Catch_Basin
- Existing_Drainage_MH
- Existing_Curb_Inlet
- Existing_Outfall
- Existing_Drainage_Pipe
- Town Boundary



0 95 190 380 570 760 Feet

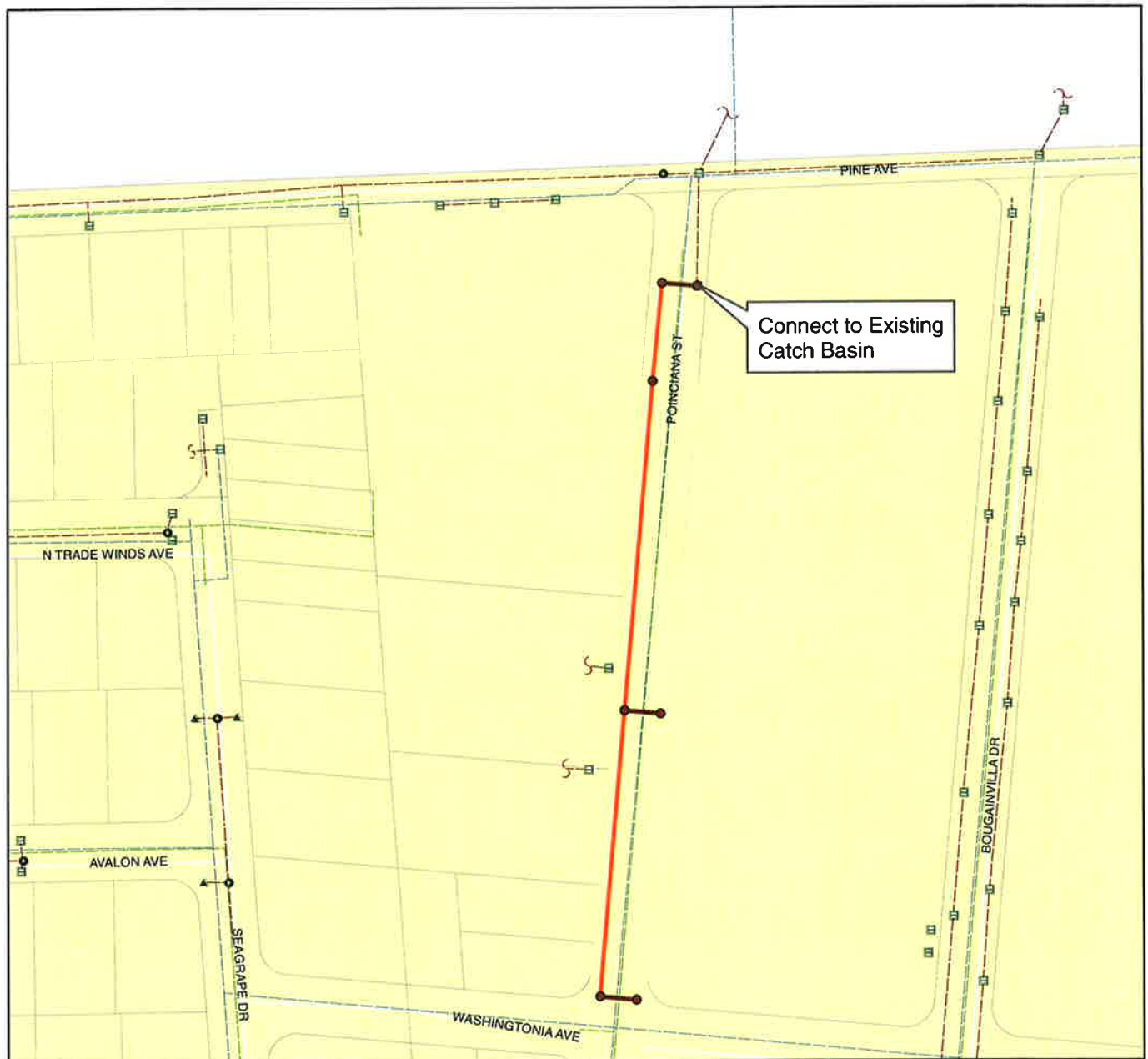


Terramar Drive**PROPOSED IMPROVEMENTS - COST ESTIMATE**

DRAINAGE	Quantity	Unit	Unit Price	Total
Core Existing Drainage Structure, Regrade Area	1	LS	\$4,000.00	\$4,000
Pavement Restoration	275	SY	\$45.00	\$12,375
			Subtotal:	\$16,375
			Mobilization:	\$1,638
			Subtotal:	\$18,013
			20% Construction Contingency:	\$3,603
			15% Design and Permitting:	\$2,702
			5% Construction Administration:	\$901
			TOTAL COST:	\$25,218

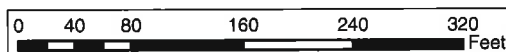
Proposed Alternative Poinciana Street from Pine Ave. to Washingtonia Ave.

Exhibit 8



Legend

- Proposed_Catch_Basin
- Proposed_Pipe**
 - 15"
 - 24" Exfiltration
 - Existing_Sewer
 - Existing_Water
- Existing_Catch_Basin
- Existing_Drainage_MH
- ▲ Existing_Curb_Inlet
- ◆ Existing_Outfall
- Existing_Drainage_Pipe



Poinciana Street from Pine Avenue to Washingtonia Avenue
PROPOSED IMPROVEMENTS - COST ESTIMATE

DRAINAGE	Quantity	Unit	Unit Price	Total
15" R.C.P. Drainage Pipe	100	LF	\$55.00	\$5,500
24" R.C.P. Drainage Pipe with Exfiltration Trench	620	LF	\$120.00	\$74,400
Catch Basins	7	EA	\$3,000.00	\$21,000
Conflict Structure	1	EA	\$5,200.00	\$5,200
Connect to Existing Drainage	1	EA	\$2,500.00	\$2,500
Remove and Dispose of Existing Drainage Structure	5	EA	\$1,000.00	\$5,000
Remove and Dispose of Existing Drainage Pipe	60	LF	\$30.00	\$1,800
Utility Offset	1	EA	\$4,000.00	\$4,000
Pavement Restoration	1,520	SY	\$45.00	\$68,400
Paved Swale, Sidewalk and Driveway Restoration	1,150	SY	\$60.00	\$69,000
Subtotal:				\$256,800
Mobilization:				\$25,680
Subtotal:				\$282,480
20% Construction Contingency:				\$56,496
15% Design and Permitting:				\$42,372
5% Construction Administration:				\$14,124
TOTAL COST:				\$395,472

Swale Program Project Areas

Legend

Swale ProgramKey

- Bel-Aire
- Silver Shores - 2
- Silver Shores - 3
- Silver Shores - 1
- Surf and Yacht Estates
- Terramar



0 300 600 1,200 1,800 2,400
Feet

